



Test & Evaluation Products for Systems Engineering Reviews

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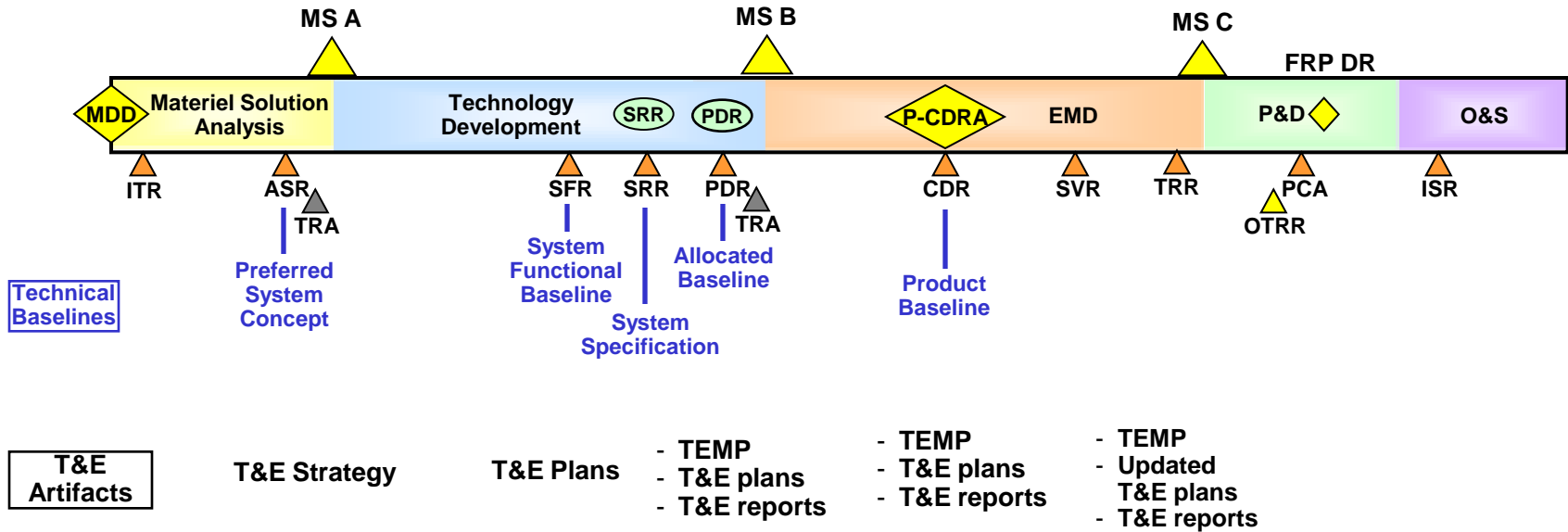
Purpose of T&E



- **The purpose of T&E is to develop and deliver actionable information (knowledge)**
 - Better knowledge enables better decisions
- **T&E developed knowledge informs decisions to reduce risk in requiring, acquiring, and employing systems / capabilities**
- **T&E knowledge is used to:**
 - Assess component performance
 - Assess system capabilities / limitations
 - Assess program progress
 - Assess technical progress
 - Improve the product and processes



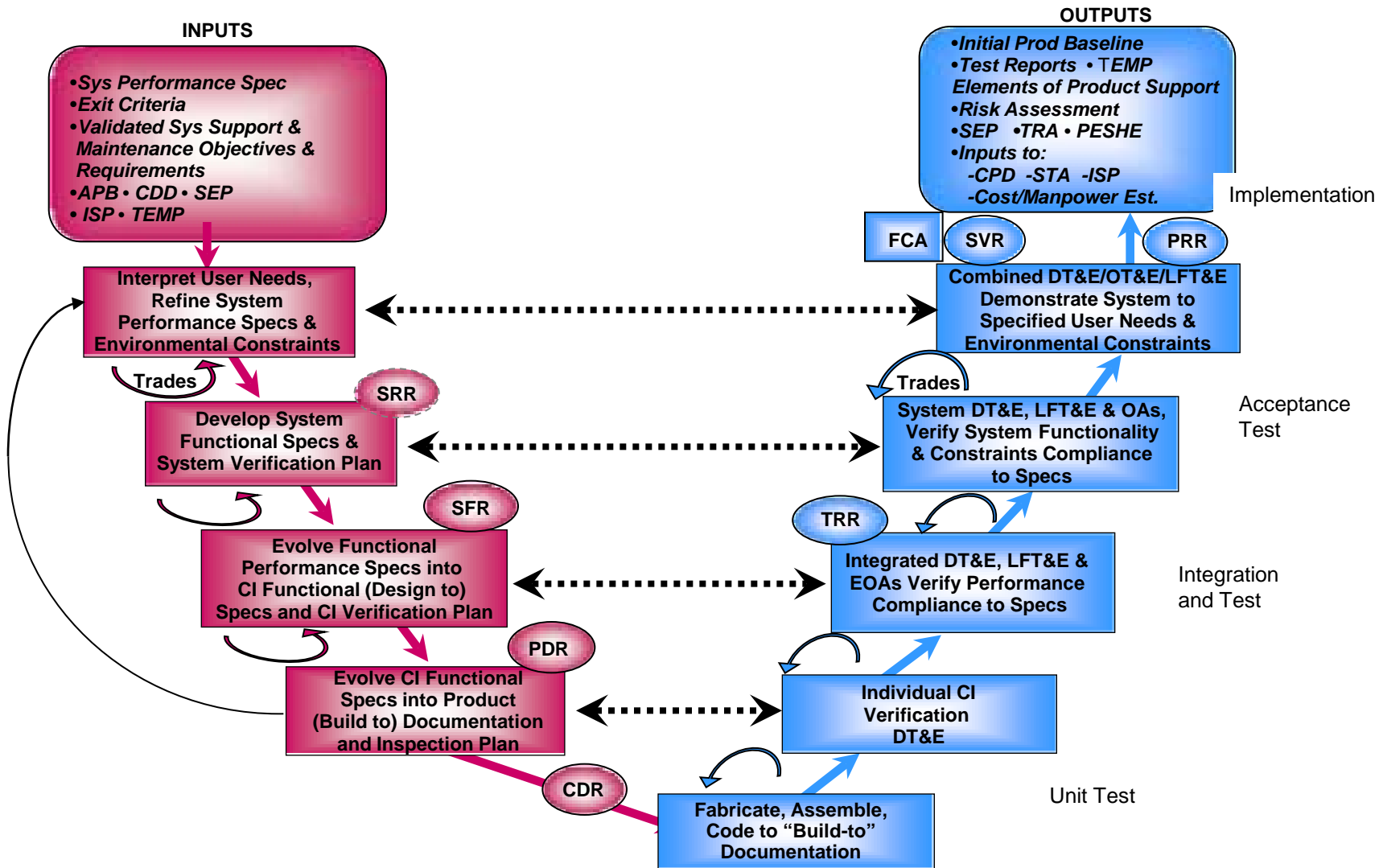
T&E Related SE Review Artifacts



- T&E Artifacts: T&E strategy, plans, & reports

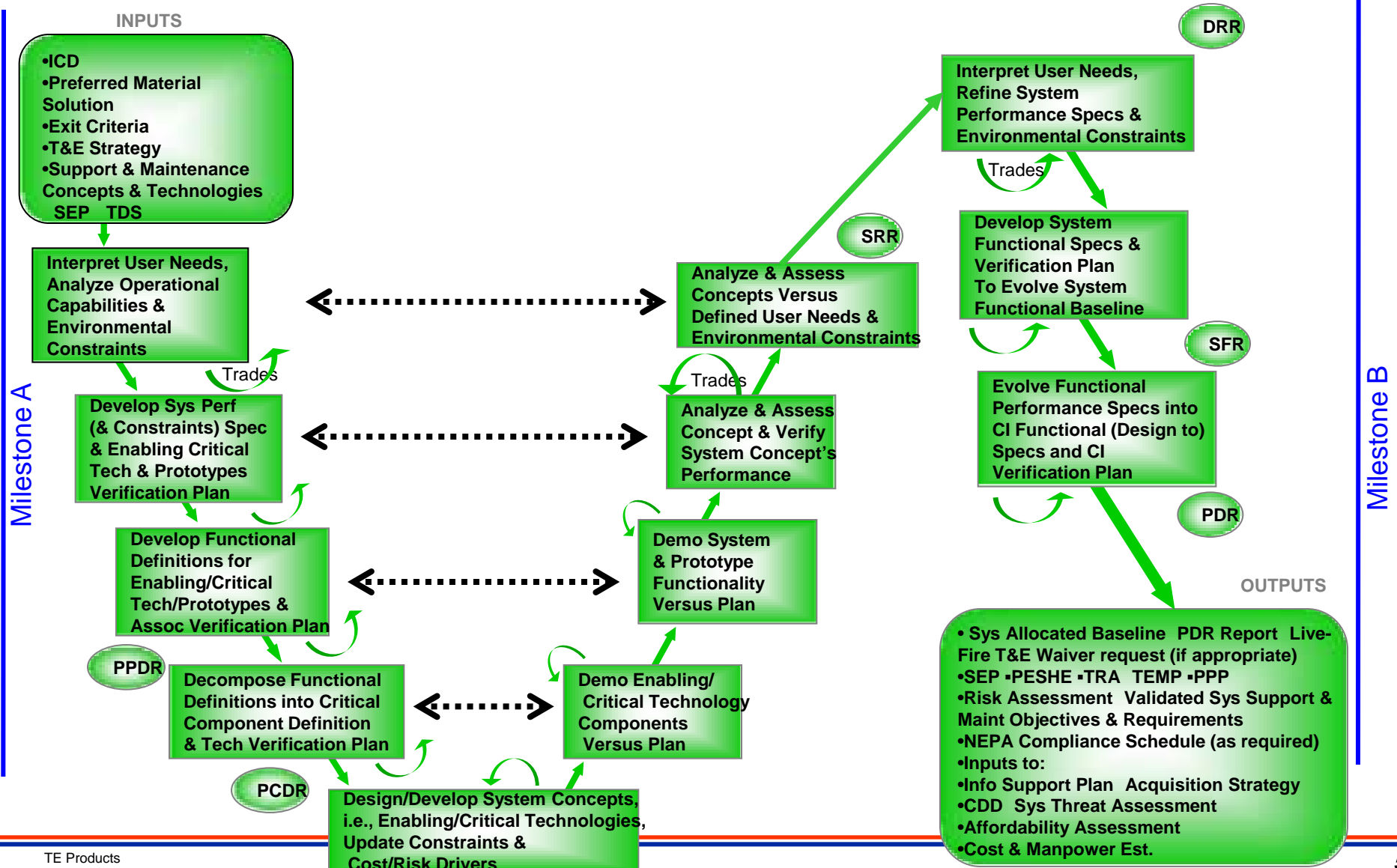


Engineering and Manufacturing Development



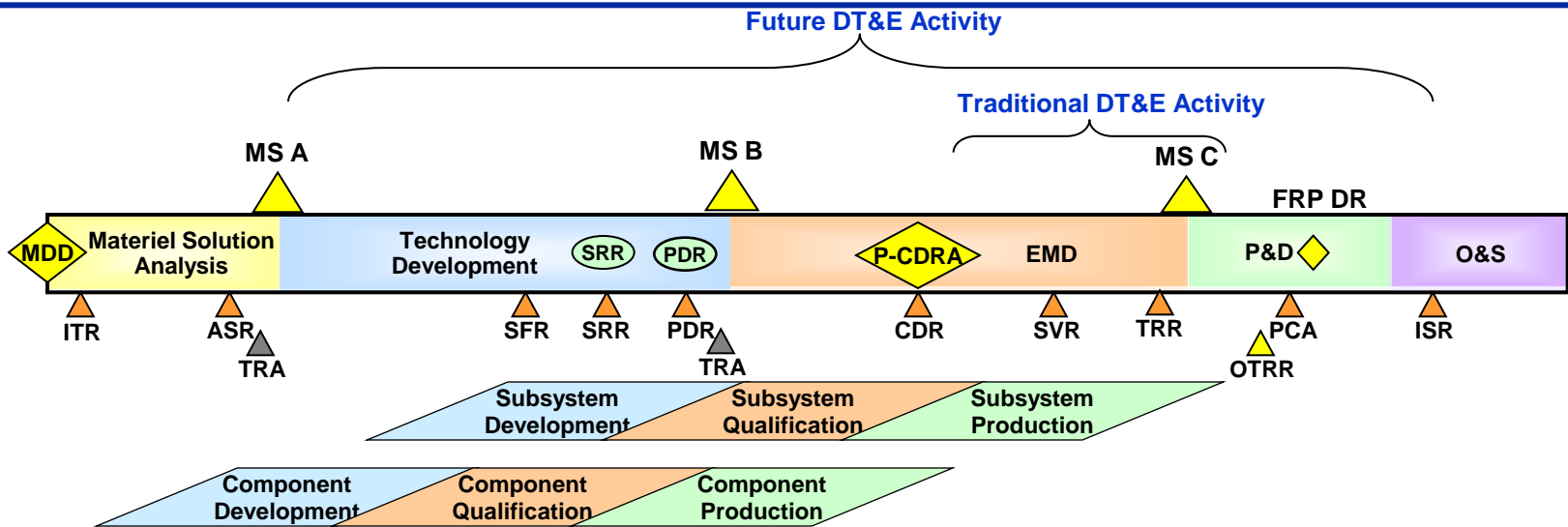


Technology Development Phase





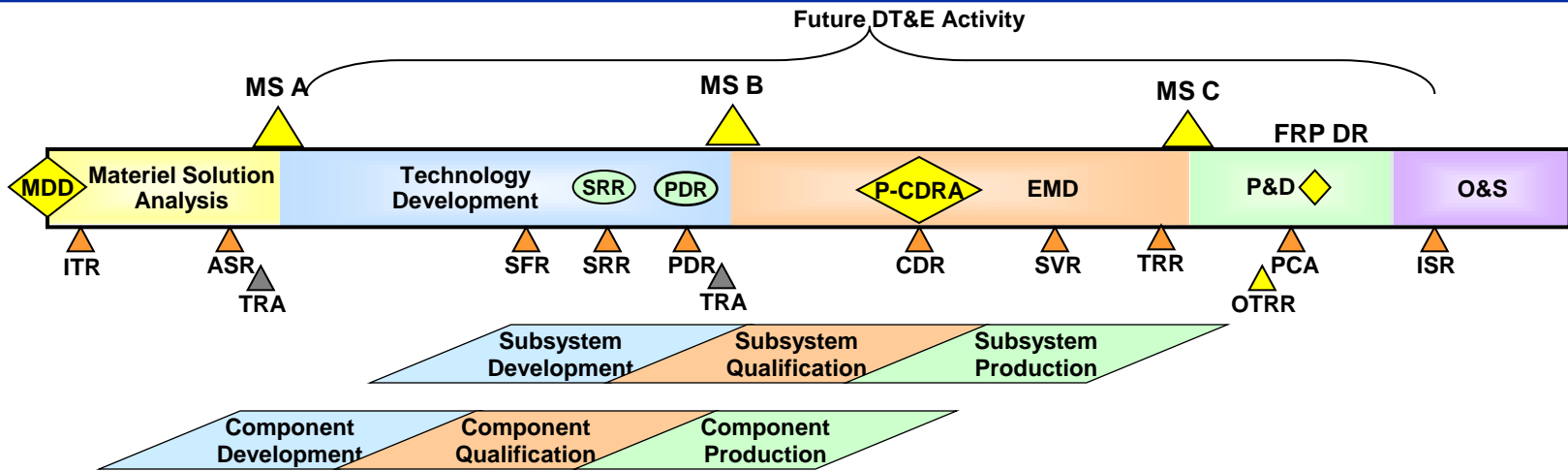
T&E Related Knowledge Needed Earlier



- **System-level reviews are a subset of overall technical reviews**
- **Component and subsystem development efforts are well-underway or complete before system-level design is finalized**
- **Traditional DT&E programs occur at the system-level, too late to fit into component and subsystem development/qualification cycles**
- **Better information sooner can benefit subsystem and system-level design decisions**



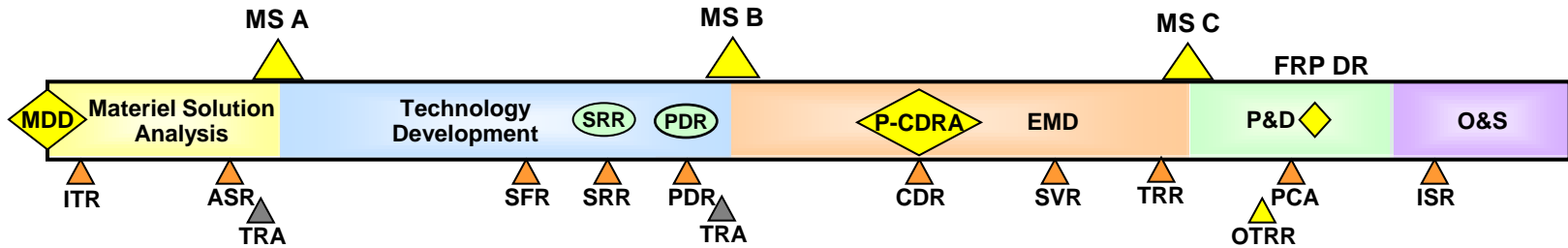
T&E Products at SE Reviews



- T&E products are more than the artifacts – value is in the contents, communications, and process to develop artifacts
- T&E information must answer the SE-related questions
 - Must also represent effective / efficient T&E program
- Focus on “verification” doesn’t use DT&E to full advantage
- DT&E should focus on acquiring knowledge of system / subsystem / component (CI) capabilities / limitations



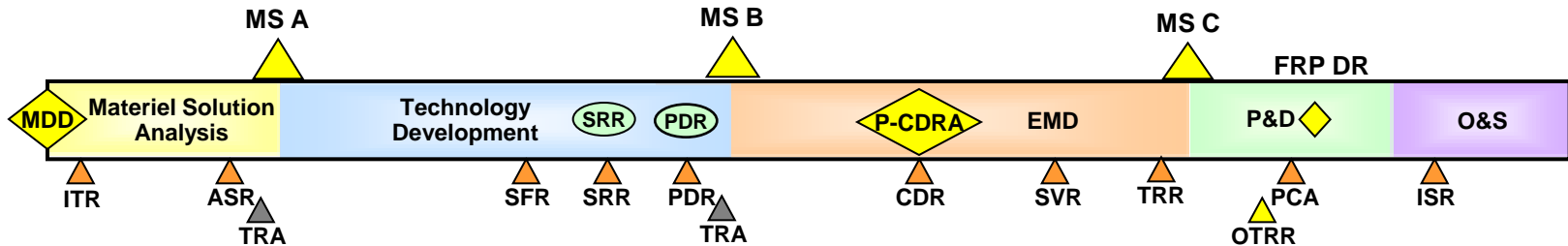
System Functional Review



- **Focus: System performance specification – Functional Baseline**
 - Are the technologies mature (enough)? Are the system performance requirements complete?
- **T&E Activity:**
 - System / configuration item (CI) T&E planning
 - Evaluate component / subsystem technology maturity
 - M&S to evaluate alternatives
- **T&E Products: T&E strategy; Technology Development T&E plan**
 - Technology measures / discriminators (TPMs / CTPs)
 - Component / subsystem performance to validate M&S
 - Technology maturity plans & assessments
 - Component maturity plans / capabilities / limitations



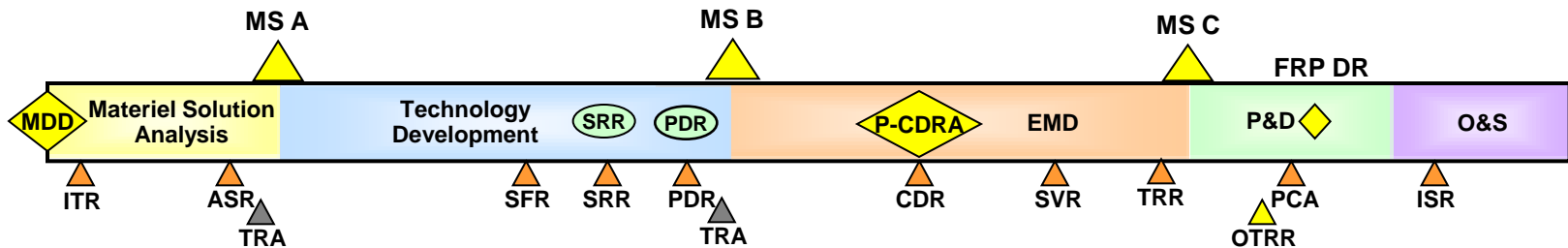
Preliminary Design Review



- **Focus: Subsystem/Configuration Item-level design – Allocated Baseline**
 - Functions, performance, interface requirements
 - Is the design ready to go final?
- **T&E Activity:**
 - M&S to evaluate alternatives
 - Technology demonstrations; component T&E
- **T&E Products: T&E Master Plan, system T&E plan, CI T&E plans**
 - TPM assessments
 - M&S validation
 - Technology maturity
 - CI maturity / capabilities / limitations



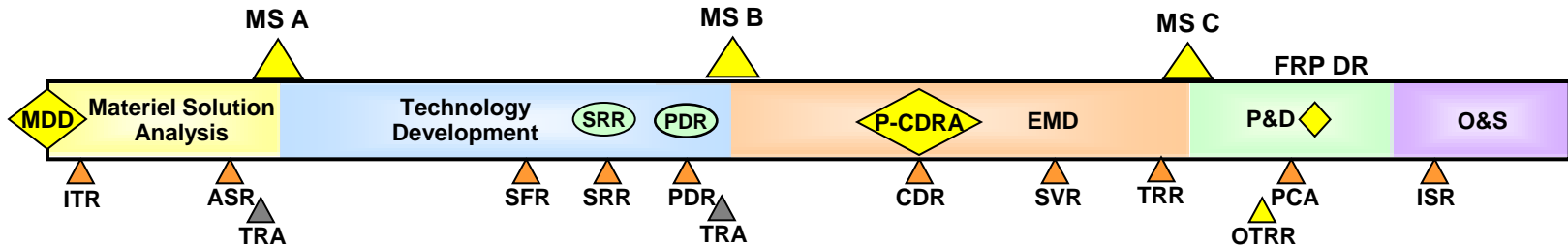
Critical Design Review



- **Focus: System design review – Product Baseline**
 - Is the design ready to start building / coding?
- **T&E Activity:**
 - CI / subsystem T&E – SIL, HITL, “open air” range
 - M&S to evaluate alternatives
- **T&E Products: TEMP, system T&E plan, detailed T&E plans, CI reports**
 - Integration issues
 - M&S validation
 - Technology maturity assessments
 - Subsystem / CI maturity / capabilities / limitations



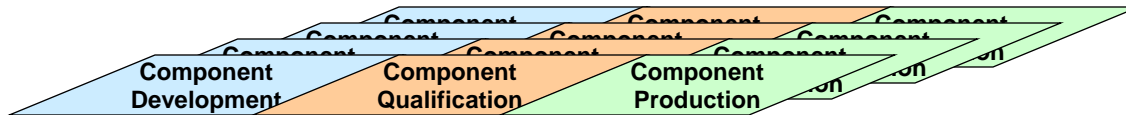
Physical Configuration Audit



- **Focus: As-Built verification review – Product baselines completed**
 - Is the system (as built) consistent with the product baseline documentation?
- **T&E Activity:**
 - Regression T&E (deficiency corrections)
 - Mission-level T&E
 - Logistics T&E
- **T&E Products:**
 - Deficiency status
 - Support documentation V&V
 - System capabilities / limitations
 - Production process maturity



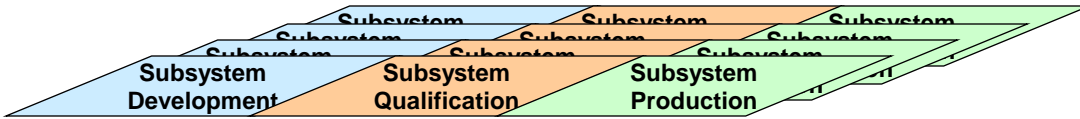
System Maturity Level 1



- **Focus: System maturity level 1 – Components work individually**
- **SE Reviews: Component level – all; System level – SFR, PDR, CDR**
- **T&E Activity:**
 - Component SIL, HITL testing
 - M&S to provide missing subsystem & system elements
 - Competitive prototyping
- **T&E Products:**
 - Integration risks
 - Technology maturity
 - Component/CI maturity / capabilities / limitations



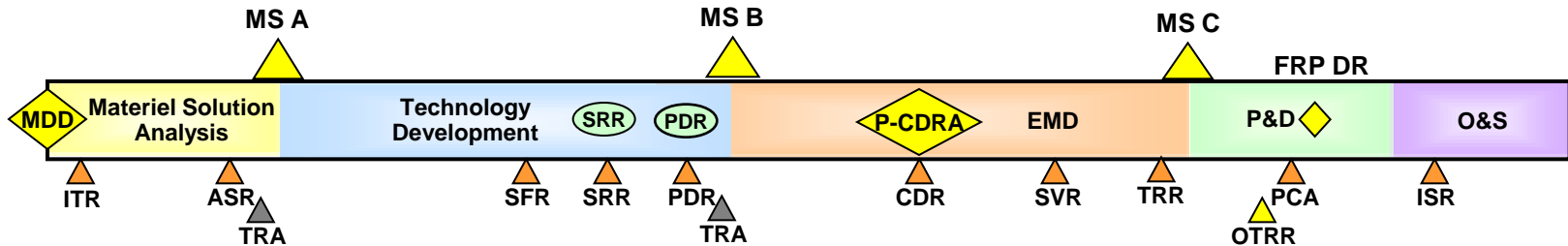
System Maturity Level 2



- **Focus: System maturity level 2 – Components work as a system - integration**
- **SE Reviews: Subsystem level – all; System level – PDR, CDR, TRR**
- **T&E Activity:**
 - Component SIL, HITL testing
 - M&S to provide missing subsystem & system elements
- **T&E Products: T&E strategy, system T&E plan**
 - Subsystem maturity / capabilities / limitations
 - Validated M&S
 - Technology maturity assessments



System Maturity Level 3



- **Focus: System maturity level 3 – System works in real-world**
- **SE Reviews: SFR, TRA, SRR, PDR, CDR, SVR, TRR, PCA, ISR**
- **T&E Activity:**
 - System / subsystem / CI DT&E; OT&E
- **T&E Products: T&E strategy, system T&E plan, OT&E**
 - System maturity / capabilities / limitations
 - System supportability and sustainability
 - Operational effectiveness, Operational suitability



Summary



- **T&E product is credible knowledge for better decisions**
- **DT&E provides verification + validation + risk mitigation**
- **DT&E should focus on efficient & effective knowledge of capabilities / limitations**
- **T&E developed knowledge should be used at the component, subsystem, and system level**

**The right information,
to the right decision maker,
at the right time,
for better decisions.**



Summary



Questions?